Chapter 3 Supplemental Questions

1. If for nothing more than to be amazed, visit <http://www.usdebtclock.org/> . On the right-hand side of the page you will see some statistics that are static ☺ (digits are not changing before your eyes). Convert the following statistics to scientific notation, rounding the coefficient to the tenth’s place and solve the problem, being mindful of significant figures.

**Convert: US Population, US Actual Unemployed, US Work Force, and US Retirees & SSI.**

**Based on the above statistics, calculate the percentage of the US population that is comprised of youths that are unemployed by virtue of their age.**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **US Population** | - | **US Actual Unemployed** | - | **US Work Force** | - | **US Retirees & SSI** | **=** | **Youths** |
| 3.1 x 108 | - | 2.2 x 107 | - | 1.4 x 108 | - | 6.8 x 107 | = | 8.0 x 107 |

* *You have to change the exponent of the “US Actual Unemployed” and the “US Retirees &* *SSI” to 108 before you subtract. Following subtraction your unadjusted result is 0.8 x 108. Although this value represents the correct precision (to the 10ths place), it is not in proper form. When placed in proper form, a zero is added beyond the decimal to reflect precision to the nearest 10th.*
* *One could reasonably argue that none of this sig fig stuff is necessary here because we are talking about people measured in numbers which have an unlimited number of sig figs☺*

**The youths make up 26% of the US Population**

1. Blood glucose monitoring is an integral part of diabetes care. There are a large number of commercially available blood glucose monitors with varying degrees of accuracy in detecting blood glucose levels. Although most meters can detect levels with less than a 20% error, very few have the ability to meet the American Diabetes Association’s (ADA) desired maximum 5%percent error in detection.

A 75mg/dl standard sample of glucose was tested by three different monitors several times. Examine the data below and answer the questions that follow.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Monitor X |  | Monitor Y |  | Monitor Z |  |
| 79.2 | 6% | 71.5 | 5% | 67.5 | 10% |
| 57.4 | 23% | 78.0 | 4% | 66.9 | 7% |
| 58.7 | 22% | 76.7 | 2% | 67.8 | 1.0 x 101% |
| 82.3 | 7% | 74.6 | 0.5% | 67.4 | 10% |

*Average 69.3 15% 75.2 3% 67.4 10%*

1. Determine the average percent error for each of these monitors

*(report your answers with the correct number of sig figs)*

Monitor **Z** Monitor Y Monitor **X**

These % error values were calculated using the average values for X, Y and Z

Do any of these monitors meet the percent error criteria established by the ADA? If so, which one? *Yes. Only monitor Y*

1. Describe the accuracy and precision of each of these monitors. For accuracy, use an acceptable error of 15% for comparison.

*Monitor X – Accurate but not precise*

*Monitory Y – Accurate but not precise*

*Monitor Z – Accurate and precise*

1. Create an acronym that will help you remember the order of metric prefixes from giga- through pico-

*Good Math kids have dancing bears do cartwheels monday mornings near paris??????*

1. Go to the website listed below and print out the “How Big are Things?” cube on card stock provide by Mrs. Pav, and assemble the cube. Write your name in ink on one side of the cube and show it to Mrs. Pav.

**Using your cube, determine what scale (which side of the cube) would be used to measure the following objects. Rewrite the measurement using that scale.**

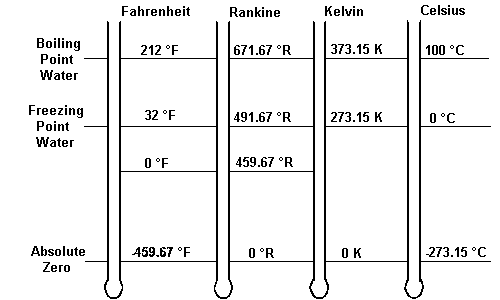
A carbon nanotube (Duh!) 0.00000030 meters \_\_\_\_\_\_*nanometers*\_\_\_\_\_\_\_

A speck of dust 0.0004 meters \_\_\_\_\_\_\_\_*micrometers*\_\_\_\_\_\_\_\_

The combined length of all the blood vessels in an average childs body 97000000 meters

\_\_\_\_\_\_\_\_*Megameters*\_\_\_\_\_\_\_\_\_\_\_\_

1. Examine the scales below and answer the questions that follow.



1. Why do you think that the celcius scale is also known as the centigrade scale?

*The number of degrees on the celcius scale between the freezing point of water and its boiling point is 100 degrees.*

1. Knowing the equation for the conversion of Kelvin to celcius, propose an equation for the conversion of Fahrenheit to Rankine (F=?).

*( Don’t worry, Fahrenheit and Rankine will not be on the test☺)*

*oR = oF + 459.67 oF = oR - 459.67*

1. Given the equation for density, draw a hypothetical line on each graph to demonstrate the relationship between the two variables on the axes. Below each graph, write whether the relation between the variables is direct or indirect (inverse).

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|  |  |  |  |
| D |  |  |  |
|  |  | M |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| D |  |  |  |
|  |  | V |  |

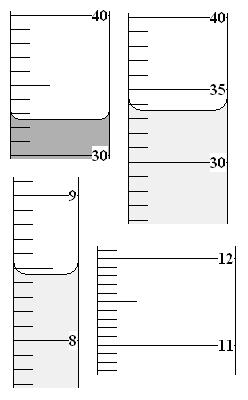
|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| M |  |  |  |
|  |  | V |  |

**Direct Direct Indirect**

Here we are making the assumption that the volume is constant if two items had different masses, the more massive item would have the greater density.

Particularly applicable to gases where volume varies in response to changing temperature.

1. The density of bromine is 3.10g/ml. The graduated cylinder below contains a particular volume of liquid bromine. From this volume and the given density, calculate the mass of bromine in the sample. Convert this mass to centigrams.(be mindful of significant digits when recording your volume and significant figures in your calculations.



Volume = \_\_\_*33.5*\_\_mL

Make sure that all your measurement includes all certain digits (33) and one digit of uncertainty (0.5).

Conversion factors have an unlimited number of significant figure so you need not worry that 100 only has 1 sig fig.

1. Determine the density of the substance from the graph below.

Density =

Will this substance sink or float when placed in water?

*It will float because its density is less than that of water (1g/ml)*

1. Examine the equations for the incomplete and complete combustion of methane in the Bunsen burner.

10g + 40g = 30g 10g + 40g = 50g

If you combine an equal number of grams of methane and oxygen in both equations, why is it that the total mass of the products for each equation are not equal.

*Less oxygen is required for reaction #1 based on the coefficients of oxygen in both reactions. In the first reaction, not all of the 40g is used. Some is left over and therefore does not contribute to the mass of the products.*